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World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse

PCF/IN05/00022

THE PATENTS ACT, 1970

It is hereby certified that annexed hereto is a true copy of Application & Complete Specification filed in respect of Patent Application No.51/CHE/2004, dated 22/01/2004 by M/s. INDIAN INSTITUTE OF TECHNOLOGY, IIT P.O. Chennai – 600 036., Tamil Nadu, India, an Autonomous Body set up by the Government of India under an act of Parliament.

.....In witness thereof

I have hereunto set my hand

Dated this the 9th February, 2005  
20<sup>th</sup> day Magha, 1926 (Saka)

  
(M.S. VENKATARAMAN)  
ASSISTANT CONTROLLER OF PATENTS & DESIGNS

OFFICE BRANCH  
PATENT OF INDIA  
Complex, 6<sup>th</sup> Floor, Annex.II  
No. 400 Anna Salai, Teynampet, Chennai – 600 018.

Form 1

THE PATENTS ACT 1970  
Application for Grant of a Patent

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We, Indian Institute of Technology, IIT P.O.,  
Chennai 600 036, Tamil Nadu, India, an autonomous body  
set up by the Government of India under an Act of  
Parliament hereby declare:

- (a) that we are in possession of an invention titled  
A METHOD OF PREPARING DRINKING WATER WITH PESTICIDE  
CONTENT 0.1 PPM AND BELOW
- (b) that the complete specification relating to this  
invention is filed with this application
- (c) that there is no lawful ground of objection to the  
grant of a patent to us

3. We further declare that the true and first  
inventor(s) for the said invention is/are:

Dr. Thalappil Pradeep, Associate Professor, Department  
of Chemistry and SAIF, Indian Institute of Technology,  
IIT P.O., Chennai 600 036, Tamil Nadu, India, Indian  
National

*Shankaran Nair*

Appukuttan Nair, Research Scholar, Department  
of Chemistry and SAIF, Indian Institute of Technology,  
IIT P.O., Chennai 600 036, Tamil Nadu, India, Indian  
National

4. We claim the priority from the application(s)  
filed in convention countries, particulars of which are  
as follows:

and declare that the above application or each of the  
above applications was the first application(s) in a  
convention country/countries in respect of my/our  
invention.

N.A.

5. We state that the said invention is an  
improvement in or modification of the invention, the  
particulars of which are as follows and of which we are  
the applicants/patentees:

N.A.

6. We state that the application is divided out of

DUPPLICATE 22 JAN 2004

our application, the particulars of which are given below and pray that this application be deemed to have been filed on under Section 16 of the Act.

N.A.

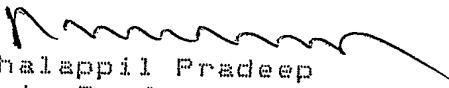
7. That we are the assignees or legal representatives of the true and first inventor

8. That our address for service in India is as follows:

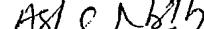
KAMATH & KAMATH, Advocates, Patent & Trade Mark Attorneys, "Vidya", 61, Fourth Main Road, Gandhinagar, Adyar, Chennai 600 020, Tamil Nadu, India

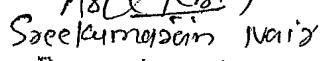
9. Following declaration was given by the inventor(s) or applicant(s) in the convention country:

I/we the true and first inventor(s) for this invention or the applicant(s) in the convention country declare that the applicants herein are my/our assignees:



Dr. Thalappil Pradeep  
Associate Professor, Department  
of Chemistry and SAIF, Indian Institute of Technology,  
IIT P.O., Chennai 600 036, Tamil Nadu, India, Indian  
National



Appukutty Nair   
Research Scholar, Department  
of Chemistry and SAIF, Indian Institute of Technology,  
IIT P.O., Chennai 600 036, Tamil Nadu, India, Indian  
National

10. That to the best of our knowledge, information and belief, the facts and matters stated herein are correct and that there is no lawful ground of objection to the grant of patent to us on this application.

11. Following are the attachments with the application:

\*Complete Specification in triplicate

\*Drawings in triplicate

\*Priority Documents NIL

\*Statement and Undertaking on Form 3 NIL

\*Power of Authority

\*Abstract in triplicate

\*Request for examination

Government Fees: Rs. 6000

We request that a Patent may be granted to us for the said invention.

Dated this the 10/10/02 day of January 2003

For Indian Institute of Technology

X

Dean

Name:

Seal of the Institute

V. Kalyanaraman

Prof. V. KALYANARAMAN  
DEAN

INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH  
INDIAN INSTITUTE OF TECHNOLOGY, MADRAS  
CHENNAI - 600 036.

To

The Controller of Patents  
The Patent Office Branch  
Chennai

THE PATENTS ACT 1970

COMPLETE SPECIFICATION

SECTION 10

A METHOD OF PREPARING PURIFIED WATER FROM  
WATER CONTAINING PESTICIDES (CHLORPYRIFOS  
AND MALATHION) AND PURIFIED WATER PREPARED  
BY THE SAID METHOD.

INDIAN INSTITUTE OF TECHNOLOGY, 11T P.O.,  
CHENNAI 600 036, TAMIL NADU, INDIA, AN  
AUTONOMOUS BODY SET UP BY THE GOVERNMENT  
OF INDIA UNDER AN ACT OF PARLIAMENT

THE FOLLOWING SPECIFICATION PARTICULARLY  
DESCRIBES THE NATURE OF THIS INVENTION AND  
THE MANNER IN WHICH IT IS TO BE PERFORMED:

This invention relates to a method of purifying water containing pesticides (Chlorpyrifos and Malathion)

It is well known that water taken out from the subsoil through bore wells and the like usually contain pesticides at a level, which is harmful for human consumption.

However, such water will be acceptable for drinking purposes if the pesticide content is reduced to acceptable levels.

This invention, therefore, proposes a method as aforesaid which is simple, yet effective.

The method, according to this invention, for purifying water containing the above pesticides of concentration greater than or equal to 0.1 ppm comprises the steps of making nanoparticles (2-150 nm diameter) of metals of gold, silver and copper, followed by soaking alumina globules of average diameter 0.5 cm in a solution of the nanoparticles of concentration  $10^{-3}$  moles/litre (concentration of metal ion used) thereby depositing the nanoparticles on the surface of the said globules; washing the globules, with the nanoparticles deposited thereon, in water; soaking about 1000 globules in 1 litre of the pesticide containing

water to effect the pesticide adsorption on the nanoparticles and thus lower the concentration of the pesticides in the water to 0.1 ppm and below; the globules being separated thereafter from the water by filtration.

### EXAMPLE

Nanoparticles of metals selected (Silver, Gold and Copper) are prepared in the known way.

Alumina ( $\text{Al}_2\text{O}_3$ ) globules of average 0.5 cm diameter are soaked in a solution of the nanoparticles in water of concentration  $10^{-3}$  moles/litre (concentration of the metal ion used) for 6 hours to deposit the nanoparticles on the surface of the said globules. The globules are then washed with water.

About 1000 globules are then mixed with 1 litre of the water to be treated to cause the pesticides in the water to be adsorbed by the nanoparticles and thus lower the concentration of the pesticides in the water to 0.1 ppm and below. The globules are separated thereafter from the water by filtration.

The method described above is applicable to the pesticides chlorpyrifos and malathion.

The terms and expressions herein are of description and not of limitation, having regard to the scope and ambit of this invention.

The concentration limit described above is not the limitation of the process, but that of the detection methodology applied.

**We claim**

1. A method of purifying water containing pesticides/greater than or equal to 0.1 ppm, comprising the steps of making nanoparticles of Gold, Silver and Copper, followed by soaking alumina globules of average diameter 0.5 cm in a solution of the nanoparticles of, concentration 10<sup>-3</sup> moles/litre (concentration of metal ion used) thereby depositing the nanoparticles on the surface of the said globules; washing the globules, with the nanoparticles deposited thereon, in water; soaking about 1000 globules in 1 litre of the water to cause the pesticides in the water to be adsorbed by the nanoparticles and thus lower the concentration of the pesticides in the water to 0.1 ppm and below; the globules being separated thereafter from the water.

9. A method of purifying water containing pesticides greater than or equal to 0.1 ppm and above as herein described and illustrated by the Example.

3. Purified water whenever prepared by a method as claimed in any one of the preceding claims

Dated this 22<sup>nd</sup> day of January 2004.

  
Kaurak & Kaurak  
Applicants' Attorney